

WHAT IS CLAIMED IS:

1. A process for making a polymer dispersion, comprising
 - (a) forming a mixture of an isocyanate-terminated prepolymer substantially devoid of acid or ionic groups and at least one monomer having at least one site of polymerizable carbon-carbon unsaturation and which is liquid or solid at room temperature, the prepolymer being soluble in the monomer(s) at the relative proportions that are present;
 - (b) dispersing the mixture into an aqueous phase under conditions sufficient to form an aqueous dispersion of a plurality of stabilized droplets that have an average diameter of no greater than about 1000 nm and contain both the prepolymer and the monomer(s), and
 - (c) subjecting the dispersion from step (b) to conditions sufficient to polymerize the monomer(s) and chain-extend said prepolymer in a single step to form a plurality of hybrid polymer/polyurethane particles having an average diameter of no greater than about 1000 nm dispersed in said aqueous phase.
2. The process of claim 1 wherein the aqueous phase contains water and at least one external surfactant.
3. The process of claim 2, wherein the isocyanate-terminated prepolymer contains from about 1.8 to about 4 isocyanate groups/molecule and has a weight per isocyanate group of about 500 to about 3000 daltons.
4. The process of claim 3, wherein the monomer(s) has a solubility in water at 25°C of less than 2 grams/liter.
5. The process of claim 4 wherein the mixture of prepolymer and monomer has a viscosity of no greater than 1000 cps (1 Pa•s) at 25°C.
6. The process of claim 5 wherein the prepolymer is water-dispersible.
7. The process of claim 6, wherein the prepolymer is the reaction product of a polyisocyanate and a polymer of propylene oxide and/or ethylene oxide.

8. The process of claim 5 wherein the droplets have an average diameter of no greater than about 300 nm.

5 9. The process of claim 8 wherein the prepolymer is chain-extended with water.

10 10. The process of claim 8 wherein the prepolymer is chain-extended with water and a water-soluble auxiliary chain extender.

11. The process of claim 5 wherein a costabilizer having a solubility in water of less than 10^{-5} g/liter is used.

12 12. The process of claim 8 wherein the surfactant is a mixture of an anionic and nonionic surfactants.

13. The process of claim 8 wherein fewer than 10 volume percent of the polymer particles are substantially devoid of polyurethane.

20 14. The process of claim 1, further comprising the step of, after step (b) and before step (c), dissolving a gaseous monomer into the aqueous dispersion under conditions such that the gaseous monomer diffuses to the stabilized droplets.

25 15. The process of claim 14, wherein the gaseous monomer is butadiene and the liquid or solid monomer comprises styrene.

16. A dispersion of polymer particles prepared in the process of claim 1.

17. A dispersion of polymer particles prepared in the process of claim 5.

30 18. A dispersion of polymer particles prepared in the process of claim 14.

19. A dispersion of polymer particles in a continuous aqueous phase, wherein the polymer particles are hybrid particles of a polyurethane and a polymer of a

monomer having at least one site of polymerizable carbon-carbon unsaturation,
further characterized in that the polymer particles have an average diameter of
less than about 1000 nm and exhibit a core-shell morphology on transmission
electron spectroscopy, in which the particles have a core portion rich in the
5 polymer and a shell portion that is rich in the polyurethane.

20. The dispersion of claim 19 wherein the monomer includes an acrylic ester.

21. A film made by coagulating or drying the dispersion of claim 19.

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22. A film made by coagulating or drying the dispersion of claim 16.